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DESIGNATING A NATURA 2000 SITE FOR *Leucorrhinia pectoralis* (Charpentier, 1825): PREVENTING FURTHER HABITAT LOSS AND EXPLORING THE ROLE OF TRANSLOCATIONS

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Abstract

Leucorrhinia pectoralis, listed in Annexes II and IV of the Habitats Directive, is a rare Palaearctic dragonfly species. In Romania, populations have severely declined or disappeared, with the only stable population documented at Pilugani, Suceava County. This population thrived in water bodies formed after peat exploitation, benefiting from the favorable habitat structure. Between 2022–2023, restoration efforts aimed at rehabilitating nearby peatland habitats. These efforts included the creation of artificial ponds to support specialized peatland invertebrates. Pilugani was proposed as a Natura 2000 site, covering 10 hectares, with the habitat type "Degraded raised bogs still capable of natural regeneration" (code 7120) and Odonata species like L. pectoralis, Sympetrum danae, Coenagrion hastulatum and Lestes virens. However, field visits in 2024 revealed significant habitat destruction at Pilugani due to anthropogenic activities. The soil was plowed, the breeding ponds were covered, threatening the population's survival. Immediate action is needed to protect L. pectoralis. Priorities include monitoring the population in 2025 and assessing the feasibility of translocating individuals to secure habitats. We give a review on dragonfly translocation and evaluate the methods.

Key words*: conservation management, Libellulidae, peat extraction, reintroduction.*

INTRODUCTION

The EU's Biodiversity Strategy for 2030 mandates that member states increase the number of protected areas to cover 30% of their total land area, while at least 10% should be strictly protected (European Commission, 2020). Though approximately 25% of Romania's land area is already protected, numerous rare species and habitats remain vulnerable due to ongoing anthropogenic pressures. The dragonfly *Leucorrhinia pectoralis* (Charpentier, 1825), a key indicator of peatland habitats currently protected under the Bern Convention and Annexes II and IV of the EU Habitats Directive (Directive 92/43/CEE), represents one such species.

Dragonflies, predators as both aquatic larvae and aerial adult forms, are crucial indicators of habitat quality. They play an important ecological role in freshwater habitats, reflecting the declining and increasing environmental conditions (Samways et al., 2025). Freshwater ecosystems are under considerable pressure, with one-quarter of freshwater fauna facing extinction (Sayer et al., 2025). 16% of dragonfly species are threatened due to habitat loss, landscape modification, changed hydrology, and climate change (Samways et al., 2025).

L. pectoralis (the large white-faced darter) is a sphagnophilic dragonfly found throughout Europe and Siberia (Boudot & Kalkman, 2015) with diminishing populational trends both at the European level (Kalkman et al., 2010) and within Romania (Manci & Popescu, 2016). Manci and Popescu (2016) confirmed the existence of *L. pectoralis* in three locations:

Snagov (north of Bucharest), ROSAC0247 "Tinovul Mare Poiana Stampei" (Suceava County), and a newly found site on exploited peatland in Pilugani (Poiana Stampei, Suceava County). This is currently the only confirmed breeding site for the species in Romania. Older records of the species could not be verified. The main threats to *L. pectoralis* are habitat loss and degradation, mainly due to drainage, backfilling, reforestation, and encroachment of vegetation and forest cover – processes observed, for example, at Tinovul Mare Poiana Stampei, where ponds suitable for larval development are small and rare (Manci & Popescu, 2016). Artificial ponds, created during peat extraction, have proven critical for the species' survival. At Pilugani, these ponds, with vegetation in medium stages of succession, provide essential habitat for *L. pectoralis* survival and breeding.

Peatland restoration is crucial for the conservation of fauna that depend on these habitats. However, to be efficient, the restoration initiatives must be customized to meet the ecological requirements of local species. Backfilling the water ponds is detrimental to the large white-faced darter, as it removes vital breeding sites. In 2024, field investigations revealed significant anthropogenic impact on the Pilugani habitat, with breeding pools partially covered and habitat structure altered, endangering Romania's last *L. pectoralis* population.

Part of a now-completed peatland restoration project, the previously exploited section of the Pilugani peatland has been proposed as a Natura 2000 site to protect *L. pectoralis*, along with other Odonata species specific to peat bogs, such as *Sympetrum danae* (Sulzer, 1776), *Coenagrion hastulatum* (Charpentier, 1825), and *Lestes virens* (Charpentier, 1825).

The aim of this study was to scientifically support the proposal of Pilugani peatland's designation as a Special Area of Conservation (SAC) under the Natura 2000 network. This initiative sustains Romania's commitments to expand protected areas and preserve sensitive species, in accordance with the EU's Biodiversity Strategy for 2030. Due to the destruction of natural habitats and the absence of other viable populations, the necessity of exploring translocation arose as an urgent conservation measure. Therefore, we also reviewed previously published translocation results applied to other Odonata species across Europe, exploring approaches that may be applicable to *L. pectoralis* in Romania.

MATERIALS AND METHODS

Study area

The Pilugani peatland, located in Suceava County, North of Romania, is situated on the terrace of the Dorna River, between the former secondary railway line that connected the village of Dornișoara to Poiana Coșnei (now out of service) and the European road E58 (Figure 1). Initially covering over 60 ha before peat extraction began in 1923, the Pilugani bog was first described by Pop (1929, 1960) and Peterschilka (1928). At that time, it was an extremely convex oligotrophic bog. Now, peat pools and canals persist in the exploited and closed section of area of interest (47°20'26.0" N, 25°10'03.6" E, 870 m a.s.l.), while peat extraction continues in the north-eastern portion.

Since 2022, a series of peatland restoration projects have been initiated in Romania, projects that included, among other objectives, the construction of artificial ponds as breeding sites for *L. pectoralis* and other sphagnophilic dragonflies, as Manci and Popescu (2016) suggested. Two of these projects, led by the Institute of Biology Bucharest, part of the Romanian Academy, focused on several peatlands in Suceava near the Pilugani site. Due to its proximity to the restored peatlands and its significance for the large white-faced darter, the Pilugani peat bog - although not included in the restoration activities - was selected as a reference site for dragonfly habitats and breeding pools. Consequently, it was frequently visited and evaluated throughout the projects.

Evaluation activities

After the discovery of *L. pectoralis* at Pilugani peat bog (Manci & Popescu, 2016), several visits were conducted by the authors - both prior to and during the restoration projects - aimed to document the presence of *L. pectoralis* and assess its breeding activity. Some of these visits were part of broader

monitoring efforts to evaluate the conservation status of species listed under the Habitats Directive, independently of the restoration projects. On-site expeditions were carried out in the area over eight years (2016-2024), from spring to autumn. The man-made pools and the marginal forested zone were visually inspected for dragonfly adults and exuviae on the surrounding vegetation, taking photographs to document the targeted species and the diversity of the local Odonata assemblage.

The character of the peat bog's habitat types and surrounding vegetation was analyzed through field surveys and aerial photographs collected with drones (DJI Mini 2). Field surveys were conducted multiple times throughout the season to assess vegetation, identify plant species *in situ*, and determine the site's conservation value. Plant species nomenclature follows Flora Europaea, as listed in the Euro+Med PlantBase (https://europlusmed.org/). Habitat types were classified according to the Interpretation Manual of Natura 2000 Romanian Habitats (Gafta & Mountford, 2008; Doniță et al., 2005). The *Sphagnum* species contributing to the moss blanket were investigated, and the morphological characteristics of several individuals were examined in the laboratory under light microscopy. We used the keys in Plămadă (1998) and Laine et al. (2018) for species identification. The nomenclature of the identified bryophytes follows Hodgetts et al. (2020).

Based on the collected information regarding habitats, vegetation, flora, and wildlife at the site, together with aerial photographs, the most appropriate boundaries of the proposed SAC were defined in ArcGIS 10.7.1 to contain all vital habitats for the long-term viability of *L. pectoralis* population.

Literature review

As the peatland at Pilugani is the only documented breeding location of *L. pectoralis* in Romania, it could be at high risk of extinction based on the criteria set by The IUCN Red List for Threatened Species (IUCN, 2012). This is due to potential threats that could further reduce its habitat, making it unsuitable to support a viable population. In the case of such an event, if habitat reconstruction activities are impossible or difficult to implement, the partial translocation of the remaining population represents a potential conservation measure. Translocation involves moving individuals of a species from one habitat to another in order to prevent extinction or aid population recovery (IUCN/SSC, 2013).

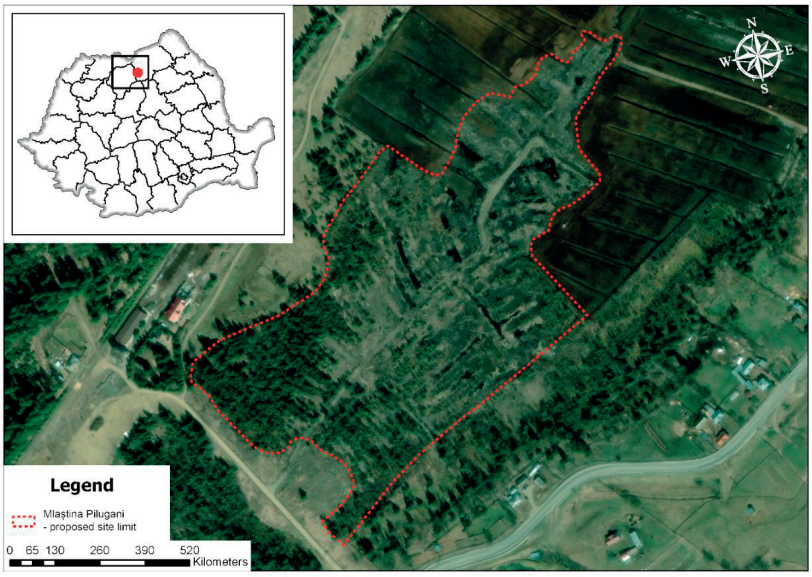

Figure 1. Limits of the proposed Pilugani peatland SAC and its location in Romania (original)

Considering this, we used scientific search engines to gather relevant information on translocation methods and other management strategies for protecting the large white-faced darter. A literature search was conducted using the Web of Science (WoS) database and Google Scholar. Due to the limited data specifically focused on this species, the search was expanded to include the entire *Leucorrhinia* genus, aiming to incorporate insights into dragonfly conservation practices more generally.

The search targeted studies directly addressing translocation and related interventions, using the keywords: "Leucorrhinia" AND (translocation OR reintroduction OR introduction* OR relocation* OR restocking OR reinforcement). This search was performed within the Topic field in WoS, yielding five articles. After applying filters to exclude theses, dissertations, books and citations, 110 results were retrieved on Google Scholar.

Additional relevant publications were explored using a snowball method of searching the referenced studies. This provided a better understanding of Odonata species' current knowledge and conservation practices.

RESULTS AND DISCUSSIONS

Animal species observed

Between 2019 and 2024, the site was visited 17 times, within and outside restoration project activities. The large white-faced darter presence was observed and confirmed on seven occasions: 28.06.2019, 02.06.2022, 23.06.2022, 27.06.2022, 22.07.2021, 16.07.2022, and 22.06.2024, after the first find of the population in 27.06.2014 (Figure 2).

The imagos were flying over the stagnant waterholes that resulted from peat exploitation. Both males and females were encountered around the large pools of water, and mating behaviour (Figure 3) was documented several times, confirming the stability of the population. Males exhibited territorial behaviour, engaging in competition with other conspecific males. They used isolated *Typha* sp. stems as vantage points for observation and hunting.

The heterogenous habitat is specific for the large white-faced darter, as described in other regional studies (Šíblová et al., 2021; Buczyńska & Buczyński, 2019).

Figure 2. Mature male of *Leucorrhinia pectoralis* at Pilugani exploited peatland (original)

Figure 3. A tandem pair of *Leucorrhinia pectoralis* at Pilugani exploited peatland, indicating the persistence of a healthy population (original)

Flood peat plains, excavated pools of different sizes, and channels are surrounded by forest vegetation (Figure 4). The perimeter of the ponds hosts herbaceous vegetation of various heights (Figure 5) providing shelter and resting places for adults. In the intermediate stage of vegetation overgrowth, the peat pools, with their littoral vegetation and macrophytes, provide essential habitat for the larvae.

The dragonfly community in the observation area included species specific to peat bogs and other habitats with acidic substrates, such as *Sympetrum danae* (Sulzer, 1776) (Figure 6), *Lestes virens* (Charpentier, 1825) (Figure 7), and *Coenagrion hastulatum* (Charpentier, 1825). Some of these once more widespread species have declined more or less severely in recent decades and are expected to become extinct in some areas unless conservation

measures are implemented to halt their decline (De Knijf et al., 2024).

In addition, a range of generalist species were observed at the water ponds, often found in hilly areas, such as *Libellula depressa* Linnaeus, 1758, *Libellula quadrimaculata* Linnaeus, 1758, *Coenagrion puella* (Linnaeus, 1758), *Coenagrion pulchellum* (Vander Linden, 1825), *Lestes sponsa* (Hansemann, 1823), *Aeshna cyanea* (Müller, 1764), and *Orthetrum cancellatum* (Linnaeus, 1758).

Figure 4. Aerial view of Pilugani exploited peatland, showing the mosaic of peat pools and forest vegetation (original)

Figure 5. Heterogeneous peatland, bordered by forests, specific habitat for *Leucorrhinia pectoralis* (original)

Similar to findings by Buczyńska and Buczyński (2019), who highlighted the importance of properly managed man-made ponds in peatland areas like those at Pilugani for sustaining sphagnophilic dragonfly species, our observations also support the conclusion that the site provides critical habitats, sustaining not only *L. pectoralis*, but also other species adapted to the acidic and nutrient-poor conditions typical of peat bogs. The richness of dragonfly fauna sustains the site's potential as a valuable conservation area.

The large white-faced darter, found at the site is included in the Bern Convention (Council of Europe, 1979), the Habitats Directive (Annexes IIa and IVa), the European Red List of Dragonflies (LC status), the Mediterranean Regional Red List of Dragonflies (LC status), and the Carpathian Dragonfly Red List (NT status) (Manci & Popescu, 2016). Moreover, in Romania, it is considered a Critically Endangered (CR) species (Manci & Iorgu, 2021). The species is protected under Emergency Government Ordinance 57/2007.

Figure 6. A mature male of *Sympetrum danae* (original)

Figure 7. Female of *Lestes virens* (original)

Figure 7. Male of *Coenagrion hastulatum* (original)

Aside from the abundant dragonfly fauna, two newt species in need of strict protection were discovered in this peatland, both listed in Annexes II, IV of the Habitats Directive: the

Carpathian newt (*Lissotriton montandoni* Boulenger, 1860), endemic to the Carpathian Mountains, and the great crested newt (*Triturus cristatus* Laurenti, 1768). The area provides an important breeding habitat for amphibians, confirmed by field observations showing dozens of common toad *Bufo bufo* (Linnaeus, 1758) pairs in amplexus, as well as other species like the common frog (*Rana temporaria* Linnaeus, 1758) and the alpine newt (*Ichthyosaura alpestris* Laurenti, 1768).

Habitats and vegetation

Pop (1960) describes the area as "one of the most beautiful and largest bogs in the region" occupying a considerable area of over 60 ha in the past. Before peat exploitation began, the bog vegetation was typical of oligotrophic bogs, with a highly convex central part, making it one of the deepest in the area, with peat thickness reaching 2-3 meters. Peat extraction started in 1923 but was halted three years later. However, since 1950, exploitation has resumed, with thousands of cubic meters of peat extracted annually for fuel and therapeutic mud baths at Câmpulung.

The disturbances caused by historical and ongoing peat extraction have created heterogeneous regions that still possess the capacity for natural regeneration, allowing recolonization by various plant species. Where such regeneration is evident, the area can be classified under habitat type 7120 – Degraded raised bogs still capable of natural regeneration, which includes the present-day vegetation of oligotrophic mires whose peat layers have been partially exploited (Frink et al., 2013). Peat deposits typically remain only at the margins of these bogs, where certain meso-oligotrophic species, typical of active raised bogs, have also persisted, albeit with altered relative abundance. In Romania, the conservation status of this habitat, present only in the Alpine Biogeographic Region, was evaluated as Unfavourable-bad (Strat & Mihăilescu, 2017).

The edges of the old exploitation sites are undergoing a process of recovery, which has led to the development of an open bog woodland dominated by tree species such as *Picea abies* (L.) H. Karst., *Betula pendula* Roth, and *Pinus sylvestris* L. in varying proportions, with a maximum height of 3.5 m and ensuring 20-60% canopy cover. The lower vegetation layer consists mainly of bryophyte species, predominantly *Sphagnum* species, which provide a suitable substrate for the establishment of characteristic oligotrophic peatland vegetation, including *Eriophorum vaginatum* L., *Vaccinium myrtillus* L., *Vaccinium vitis-idaea* L., *Huperzia selago* (L.) Schrank & Mart., *Lycopodium clavatum* L., and *Lycopodium annotinum* L. Among these, *Drosera rotundifolia* L. (Figure 8) stands out as a typical carnivorous plant of oligotrophic bogs, relying on insect prey to supplement its nutrient intake in nutrient-poor environments, but also vulnerable (Oltean et al., 1994) to habitat degradation and changes in water availability. Likewise, *Andromeda polifolia* L. and *Vaccinium oxycoccos* L. are significant components of these habitats. These species are considered rare (Oltean et al., 1994; Dihoru & Dihoru, 1994) and endangered (Witkowski, 2003), highlighting the conservation value of these recovering peatland areas. In some places, swampy areas have vegetation consisting of small islands of oligotrophic vegetation and patches of *Carex rostrata* Stokes in wetter zones.

Figure 8. *Drosera rotundifolia* (original)

In the peat extraction depressions, where ponds and ditches have formed, vegetation repopulation is observed along the edges. The vegetation border includes tree species like *Salix caprea* L. and *Alnus glutinosa* (L.) Gaertn. However, most water bodies are dominated by *Typha latifolia* L. communities, accompanied by *Carex rostrata* Stokes, *Carex echinata* Murray, and *Juncus effusus* L., Other species, such as *Alisma plantago-aquatica* L., *Utricularia vulgaris* L. and *Potamogeton*

natans L., were also observed in the water column.

In areas with exposed peat at the edges of the current exploitation site, where flat surfaces can still retain high moisture levels, we identified a consistent population of the marsh clubmoss *Lycopodiella inundata* (L.) Holub (Figure 9). It is a rare (Oltean et al., 1994; Dihoru & Dihoru, 1994) and endangered (Witkowski, 2003) species, capable of surviving in this early-successional stages of bog recovery, colonizing open, wet peat surfaces created by disturbances as peat extraction. Due to habitat loss and hydrological changes, its populations have significantly declined, making it a species of conservation concern in many regions of Europe. In Romania, *L. inundata* along with other clubmosses present in the peatland (*H. selago*, *L. clavatum*, and *L. annotinum*), are species listed in Annex V of the Habitat Directive (Council Directive 1992).

Figure 9. *Lycopodiella inundata* (original)

These highly specialized species of nutrient-poor wet areas indicate that suitable bog conditions persist, supporting ongoing natural recovery in the previously exploited Pilugani Bog. Their survival suggests that certain parts of the site maintain the hydrological and ecological characteristics essential for bog-specialist species.

The *Sphagnum* layer includes several species identified as *Sphagnum angustifolium* (Russow) C.E.O. Jensen, S. *capillifolium* (Ehrh.) Hedw., *S. medium* Limpr. (Figure 10), *S. palustre* L. and *S. squarrosum* Crome (Figure 11). As the entire genus Sphagnum is protected under the European Habitats Directive, these species are of particular conservation interest, further strengthening the case for declaring this area legally protected.

The entire area delineated at the end of the investigations for the SAC standard data form proposal, under the name "Mlaștina Pilugani", encompasses the habitats essential for the dragonfly community, including the protected habitat type 7120 – Degraded raised bogs still capable of natural regeneration and covers over 9.7 ha (Figure 1).

Figure 10. *Sphagnum medium* Limpr. (original)

Figure 11. *Sphagnum squarrosum* Crome (original)

Habitat loss and degradation

Unfortunately, during one of the last visits, conducted on 07.07.2024, a series of ongoing anthropic activities were observed at the site. The soil had been plowed, many of the breeding peat pools were filled with earth (Figure 12), and drainage channels were dug along the dirt road. No adult individuals of *L. pectoralis* were observed, and the ponds with permanent water that used to be close to the road had disappeared.

During a subsequent visit in September 2024, aerial investigations revealed that at least some of the pools were still holding water, which was apparently sufficient for the larval

development of large white-faced darter (Figure 13).
However, since the area is not protected, it is possible that these activities continued into the late season. As a result, the degree of impact on this endangered dragonfly population is currently unknown but likely significant.

Figure 12. Results of human activities impact on some of the habitats at Pilugani, backfilling of peat pool (original)

Figure 13. Aerial view of Pilugani peatland after human activities, some water bodies still visible (original)

A medium-term plan for the future should involve a collaborative approach that brings together scientists, local policymakers, and community stakeholders in order to reach a balance between different views on land value (ecological *vs.* economic) (Pop et al., 2025), along with seeking alternative solutions that address both conservation and economic needs. This strategy helps ensure that peatland management considers all perspectives and develops long-term solutions for both habitat protection and local development.
Short-term urgent tasks that should be taken into consideration include:

- Conducting a population assessment and monitoring starting in May 2025 to assess larval survival and emergence by searching for exuviae, monitoring adult presence during the flight period, and observing reproductive behavior;
- Mapping and re-evaluating the remaining water bodies by measuring their surface area, depth, and vegetation cover to assess their suitability for larval development;
- Performing a threat analysis and engaging stakeholders by investigating ongoing land-use changes, talking to landowners about future planned activities, and exploring the potential for solutions towards a conservation approach of the remaining habitats;
- If immediate risks of habitat loss persist, assess the potential for translocating larvae or adults to restored peatlands in the region where water ponds exist or have been created, such as ROSCI0247 "Tinovul Mare Poiana Stampei".

If the persistence on-site of the large white-faced darter is confirmed, raising awareness among local communities, authorities, and stakeholders is necessary to gather local support for the SAC designation process.

Aspects of translocations found in literature
All the literature retrieved from the scientific search engines were reviewing based on content to retain only relevant publications. Several articles were excluded as they did not align with the study's focus. These excluded papers either addressed translocations or reintroductions in other species, mentioned translocations only as a conservation method without providing details on its application or referred to "intra-male sperm translocation" - a behavior unique to odonates, where males transfer sperm from the genital pore in the ninth abdominal segment to the seminal vesicle in the second abdominal segment before mating (Rivas-Torres et al., 2019).
Overall, ten translocations of dragonfly species were found in our literature search. Four of them targeted damselfly species like *Ischnura verticalis* (Say, 1840), *Ischnura gemina* (Kennedy, 1917), *Nehalennia speciosa* (Charpentier, 1840) and *Coenagrion*

mercuriale (Charpentier, 1840) (Hannon & Hafernik, 2010; Hannon & Hafernik, 2007; Mauersberger, 1998; Thompson et al., 2015). Only two anisopteran species were reported as successful translocations across five receiving sites. One in Algeria, for *Urothemis edwardsii* (Selys, 1849) during 2011-2015 (Khelifa et al., 2016), and the others for *Leucorrhinia dubia* (Vander Linden, 1825) in the United Kingdom (three receiving sites) (Clarke, 2014; British Dragonfly Society, 2024; Meredith, 2017; Cumbria Wildlife Trust, 2024) and the Czech Republic (one receiving site) (Dolný et al., 2018; Šigutová et al., 2025). *L. dubia* shares similar habitat requirements with *L. pectoralis*, as both species thrive in heterogeneous peat bogs with forested vegetation. While there are some differences in specific requirements, such as pH tolerance (Buczyńska & Buczyński, 2019), the successful translocations of *L. dubia* can serve as a model for developing a translocation plan for *L. pectoralis*, as no such translocations have been attempted for the latter species. Transferring eggs (collected directly from females or along with a mix of water and *Sphagnum* moss), adults, or individually selected last-instar larvae were all tested in these studies. The translocation activities were carried out over one or more years, typically in early spring (for larvae) or late summer (for the *Sphagnum* mix), at the end of the reproductive season (Clarke, 2014; Meredith, 2017; Dolný et al., 2018). The egg transfer approach is time-consuming, while the transfer of adults results in a high loss, as they tend to fly away disoriented (Clarke, 2014; Dolný et al., 2018). The translocations in the United Kingdom proved successful through several phases of translocating larvae and *Sphagnum* substrate combined (Clarke, 2014; Meredith, 2017; British Dragonfly Society, 2024). The results were tested through weekly monitoring of emergences via exuvia counts and transect surveys for adults. However, the reported monitoring was not long-term. In contrast, the Czech Republic translocation has proven successful through 23 years of monitoring the now self-sustaining population after only one transfer of larvae in the ultimate instar phase (Dolný et al., 2018; Šigutová et al., 2025). Population size was also evaluated and proven stable through the capture-mark-recapture method, although old and new pool use had changed (Šigutová et al., 2025).

Of the parameters to count for in a translocation, water pH could be the most important, along with *Sphagnum* cover, especially if the receiving site is a newly constructed pool (Šigutová et al., 2025).

The amount of transferred larvae per phase varies from 100 to 200 individuals (Meredith, 2017), placed in tubes with water and *Sphagnum* stored in cool boxes or simply in buckets with water and moss (Meredith, 2017; Dolný et al., 2018). The volume of *Sphagnum*, odonata eggs, and first-stage larvae transferred at the end of the flight season ranged between 40 and 60 liters (Clarke, 2014; Meredith, 2017). On all occasions, care was taken to evenly distribute the transferred organisms and material in the receiving pools to avoid loss through cannibalism (Clarke, 2014; Meredith, 2017; Dolný et al., 2018)

Other technical and ethical aspects, such as monitoring the donor site, continuous management of the receiving site, and genetic screening of populations, have been discussed in the literature (Jourdan et al., 2019; Šigutová et al., 2025). However, these considerations are currently beyond the scope of this study, as rescue conservation activities may need to be implemented quickly at the Pilugani peatland.

Using a snowball approach, where we examined the references in relevant articles, we also identified several LIFE projects that have implemented management measures either directly aimed at or at least beneficial for the conservation of the Large white-faced. For instance, the LIFE project *Réhabilitation fonctionnelle des tourbières du massif jurassien franc-comtois* (LIFE13 NAT/FR/762) targeted wetland restoration. The project, which ran from 2014 to 2020, aimed at pool rehabilitation, which increased occupation by this species (Decoin et al., 2018).

The Large white-faced darter (*L. pectoralis*) is among the top five invertebrate species targeted by LIFE projects, with 30 unique projects focusing on its conservation (EASME, 2020). Although we did not conduct an exhaustive search of LIFE projects, we found no indication of translocations being implemented. These projects have concentrated on wetland habitat restoration, as well as on mitigating threats

associated with habitat loss and degradation. If the population at the degraded site of Pilugani continues to thrive, a potential next step would be to evaluate all activities carried out in LIFE projects to assess their effectiveness and explore efficient conservation measures for the proposed SAC area.

CONCLUSIONS

The proposed Natura 2000 site "Mlaștina Pilugani", a degraded peatland, demonstrates that even ecosystems that have been extensively exploited and modified by humans can still support habitat-specialist and rare species, such as sphagnophilic dragonfly species. The area holds significant ecological and biodiversity value in terms of its vegetation and fauna.

The disturbances at Pilugani are indeed concerning, but as long as not all the peat pools are drained or backfilled, the metapopulation structure of this dragonfly species - where local extinctions can be balanced by recolonization of nearby pools - provides some hope for the area's recovery.

The value of this site is not only due to the presence of European-protected habitats and species, but also because it serves as a unique breeding site for the nationally Critically Endangered species *Leucorrhinia pectoralis* (Manci & Iorgu, 2021). However, balancing the economic value of land with its biodiversity value requires financial compensation for landowners and increased public awareness (Pop et al., 2025).

Although small, compared with the historical extent of the old peat bog, its designation as a Special Area of Conservation within the Natura 2000 network can contribute with added value towards reaching the targets of the European Biodiversity Strategy for 2030 for Romania.

If the translocation of the large white-faced darter population is deemed necessary, the newly constructed peat pools in nearby restored peatland could serve as receiving sites. The planned activities could also draw a model for other conservative translocations across the country within the legal framework and with the necessary permits.

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